

ERRATA SHEET

No. 1

ENGINEERING AND DESIGN

USACE BRIDGE SAFETY PROGRAM

ER 1110-2-111

1 August 2007

Please change Basic ER, page 1, to add Supersessions and Rescissions statement. Supersessions and Rescissions Statement to read as follows:

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This Engineer Regulation supersedes ER 1110-2-111, dated 31 August 2002.

CECW-CE  
CECW-CO

DEPARTMENT OF THE ARMY  
U.S. Army Corps of Engineers  
Washington, DC 20314-1000

ER 1110-2-111

Regulation  
No. 1110-2-111

1 August 2007

Engineering and Design  
USACE BRIDGE SAFETY PROGRAM

## 1. Purpose

This regulation defines the policy and prescribes procedures and responsibilities for the periodic inspection and evaluation of bridges owned or maintained by the U.S. Army Corps of Engineers (USACE) on civil works projects.

## 2. Applicability

This regulation applies to all USACE Commands having Civil Works responsibilities.

## 3. Distribution Statement

Approved for public release; distribution is unlimited.

## 4. Background

The Surface Transportation Assistance Act of 1978 (PL 100-17) requires that all structures defined as bridges (see reference a) on public roads shall be inventoried and inspected in accordance with the National Bridge Inspection Standards (NBIS). Under the standards, each Federal Agency is required to record and maintain structure inventory and appraisal data on each bridge and report the data to the Federal Highway Administration (FHWA) upon request.

## 5. Policy

All bridges identified within this regulation owned or maintained by the USACE on Civil Works projects shall be inspected and inventoried to ensure their safety and structural integrity in accordance with this regulation and the guidance contained in the Corps of Engineers Bridge Inventory System (CEBIS). All inspections and inventories shall be officially reported in CEBIS, located at <https://cebis.wes.army.mil>, using the standard formats supplied.

a. Public highway/roadway bridges (see part 650.305 of reference a for definition) with spans greater than 6.1 m (20 feet) shall be inspected and evaluated in compliance with the NBIS and this regulation.

b. Railway bridges shall be inspected and evaluated in accordance with references f through i, p, q, r, w, and z.

c. Short Span, Non-Public Access, and Public, Non-Public, and All Other Pedestrian bridges (see paragraphs 6b through 6f for definitions) shall be inspected and evaluated in accordance with this regulation and a comprehensive, uniform plan approved by each Major Subordinate Command (MSC) in consultation with HQUSACE (CECW-CE). Inspection scope and frequency and inspector qualifications for All Other Pedestrian bridges shall be determined by the District Bridge Program Manager (see paragraph 10c).

d. An inventory of all bridges defined herein shall be prepared and maintained in CEBIS.

e. All existing bridges over tidal and non-tidal waterways with public vehicular traffic should be evaluated for the risk of failure from scour during the occurrence of a flood on the order of magnitude of the 500-year return period. Bridge scour evaluations shall be conducted for each bridge to determine whether it is scour critical in accordance with reference j. See reference z for additional guidance and standard forms for recording scour data. Scope of scour evaluations for all other bridges shall be determined by the District Bridge Program Manager (see paragraph 10c for definition) following guidelines of reference z after consultation with Hydraulic and Geotechnical engineers.

f. Fracture critical members (FCMs) on all bridges shall be identified and recorded. An inspection plan for FCMs shall be developed and executed. See reference z for additional guidance.

g. Seismic performance data shall be reported for each bridge. Seismically vulnerable bridges shall be evaluated in accordance with paragraph 15.

h. HQUSACE (CECW-CE) shall send consolidated SI&A data of USACE Public Highway/Roadway bridges to the FHWA to comply with the NBIS.

## **6. Definitions**

a. Public Highway/Roadway bridges are bridges defined in part 650.305 of reference a.

b. Short Span bridges are all bridges open to public vehicular traffic with spans less than or equal to 6.1 m (20 feet).

c. Non-Public Access bridges are access and service bridges used for operation and maintenance purposes only. Only traffic related to operation and maintenance of USACE projects is allowed.

d. Public Pedestrian bridges are bridges open to public use intended to carry primarily pedestrian and/or bicycle traffic. These bridges may be subjected to an occasional single maintenance vehicle or similar type loading.

e. Non-Public Pedestrian bridges are access bridges used for operation and maintenance purposes only. These bridges may be subjected to an occasional single maintenance vehicle or similar type loading. Only traffic related to operation and maintenance of USACE projects is allowed.

f. All Other Pedestrian bridges are public and non-public pedestrian bridges where the design and existence, as determined by the District Bridge Program Manager, does not present a significant hazard to the public or operating personnel, the consequences of failures are minor, and the associated risk is acceptably low. This category of bridge consists of low height trail crossings or minor access walkways that receive limited use and where failure does not likely result in a probable loss of life.

## **7. Types of Safety Inspections**

Inspection during the service life of the bridge includes an initial inventory inspection after construction is complete, periodic routine inspections, damage, in-depth, or special inspections to evaluate damage or deterioration or to monitor performance, and underwater inspections that require special equipment for access. Descriptions of these types of inspections are included in Reference a. Also see reference z for detailed descriptions.

## **8. Frequency of Inspections**

a. Routine inspections. Routine inspections for vehicle and pedestrian bridges shall be conducted at regular intervals not to exceed twenty-four months unless the condition of the bridge indicates otherwise. See below for guidelines on determining alternate intervals. See reference z for guidelines on railway bridges.

b. Fracture Critical Member (FCM) inspections. FCM inspections for all bridges shall be conducted every 24 months unless the condition of the bridge indicates otherwise. See below for guidelines on determining alternate intervals. See reference z guidelines on railway bridges.

c. Underwater inspections. Underwater bridge members shall be inspected to the extent necessary to determine the condition and structural integrity of the bridge. Underwater inspections include wading, probing, diving, and soundings as required. An underwater inspection shall be performed using wading and probing methods, where possible, during routine inspections. An underwater inspection of the bridge substructure and surrounding channel, which cannot be inspected visually by wading or probing, using diving or other appropriate techniques shall be conducted at an interval not to exceed 60 months unless the condition of the bridge indicates otherwise. See below for guidelines on determining alternate intervals. See reference z for guidelines on railway bridges. Coordinate underwater inspections of bridges supported by dams with the Dam Safety Officer. See reference b for dam inspection requirements.

d. Damage, in-depth, and special inspections. A damage inspection is an unscheduled inspection to assess structural damage resulting from environmental factors or human actions. An In-depth inspection is a close-up, inspection of one or more members to identify any deficiencies not readily detectable using routine inspection procedures. A special inspection is an inspection scheduled at the discretion of the District Bridge Program Manager, used to monitor a known or suspected deficiency. These inspections are necessary after bridges experience significant events such as hurricanes, earthquakes, fires, floods, or collisions or when

conditions warrant them. See reference z for guidance on determining the need for these types of inspections.

e. Maximum inspection intervals. The maximum inspection interval may be increased for bridges if past inspection reports and favorable experience and analysis justify the increase. The plan for inspecting any bridge at intervals greater than 24 months should be based on the type (i.e., with tires, treads, or on a track) and frequency of vehicular traffic that may cause fatigue or deterioration of the structural members. See reference z for guidance.

(1) Routine Inspections. Maximum inspection intervals of 48 months and 60 months between inspections are permitted for bridges described in paragraphs 5a and 5c, respectively. Proposals to inspect bridges described in paragraph 5a at intervals greater than 24 months shall be submitted to the USACE Bridge Program Manager through the MSC (see reference z for guidelines) and is subject to MSC approval.

(2) FCM Inspections. Maximum inspection intervals for bridges described in paragraph 5a with FCM are 24 months and for bridges described in paragraph 5c with FCM are 60 months. Proposals shall follow guidelines outlined in reference z. A copy of the request shall be provided to the MSC. Proposals to inspect bridges described in paragraph 5c at intervals greater than 24 months shall be submitted to the MSC.

(3) Underwater Inspections. Certain underwater structural elements may be inspected at greater than sixty-month intervals, not to exceed seventy-two months. This may be appropriate when past inspection findings and analysis justifies the increased inspection interval. Proposals to conduct underwater inspections at intervals greater than 60 months shall be submitted to the USACE Bridge Program Manager through the MSC (see reference z for guidelines) and is subject to MSC approval.

f. Minimum inspection intervals. Inspection intervals less than those required above may be necessary for bridges in poor condition or those subject to unusual loadings. See the USACE Bridge Inspection Manual for guidelines on shorter inspection intervals.

## **9. Organizational Responsibilities**

HQUSACE, MSC, and District responsibilities require teamwork among Engineering and Operations Divisions and Programs/Project Management organizations at all levels, and with the U.S. Army Engineer Research and Development Center (CEERD). The responsibilities are described below.

a. District. The District's chief of engineering function is responsible for ensuring a safe bridge inventory through proper inspection and reporting. The District's engineering element shall be responsible for the following activities:

(1) Providing District Bridge Program Manager (see paragraph 10) responsible for implementation of all phases of the District Bridge Safety Program, including formulating the inspection plans, conducting the inspections, processing and analyzing the results of the

instrument observations, evaluating the condition of the bridges, determining scope and frequency of future inspections, preparing and submitting the inspection reports, and performing an independent technical review.

(2) Developing and maintaining a Bridge Project Management Plan (PMP) which includes a Quality Management Plan (QMP), a Quality Control Plan (QCP), and a Quality Assurance Plan (QAP). The PMP shall be updated annually by 15 January of each year.

(3) Preparing, maintaining, and updating the District's CEBIS database. Entering all inspection reports into the CEBIS database, certified by the District's Chief of Engineering function and ready for QA review by the MSC, within 60 days after the inspection is completed. All data entries shall follow the formatting defined in reference z. The District CEBIS data, including entering all inspection and inventory data, shall be finalized by no later than 15 February of each calendar year

(4) Inviting a representative from the Operations Division to participate in each inspection. For the Initial Inventory Inspection after completion of construction, a representative from the Construction Division and Operations Division shall be invited to participate.

(5) Coordinating with Operations Division and Programs and Project Management on the annual operations and maintenance (O&M) budget process for funding existing bridge inspections, evaluations, repairs, improvements, or rehabilitation related to bridge safety. The Project Management Plan (PMP) budget, schedule, and justification shall be provided to the Operations Division and Programs and Project Management organizations for use in the O&M budgeting process.

(6) Notifying any city, county, state, or local government and operating railway company which has jurisdiction of the roadway, pathway, or railway of the inspection.

(7) Providing status on the bridge inspection and evaluation program at least annually to the District's Dam Safety Committee.

(8) Providing quality control on all inspections and evaluations and ensure technical reviews are conducted as required.

(9) Tracking of recommendations and remedial actions using guidelines of reference z.

b. MSC. The MSC's engineering element shall be responsible for the following activities:

(1) Designating a MSC Bridge Program Manager responsible for the Bridge Safety Program at the MSC.

(2) Identifying qualified Regional Technical Experts to conduct technical quality assurance reviews of District bridge inspections and evaluations and other Bridge Safety Program related products and ensuring reviews are conducted as required.

(3) Conducting QA of District programs, reviewing and monitoring the data collection, processing, evaluation, and inspection activity; maintaining the schedule of inspections and status of reports; and, verifying qualifications of the Bridge Inspection, Evaluation and ITR teams.

(4) Approving inspection reports. MSC Commanders are authorized to approve inspection reports. If the MSC decides to delegate approval authority to the Districts, then it should retain responsibility for program management and oversight. Review and approval of reports should be completed within 90 days after completion of the field inspection. This period should include satisfactory resolution of all review comments.

(5) Coordinating with Division Operations Element and Programs and Project Management on the annual O&M budget process for funding existing bridge inspections, evaluations, repairs, improvements, or rehabilitation related to bridge safety.

(6) Reviewing each approved District PMP by 15 February of each year.

(7) Develop and maintain a Bridge Project Management Plan (PMP) and prepare an annual QA report. Furnish annual QA reports to CECW-CE by 15 April of each year. The MSC Bridge Program Manager shall solicit technical assistance when developing the PMP for complex bridges.

(8) Finalizing CEBIS by 15 March of each calendar year. Finalizing CEBIS includes review of inspection reports and ensuring each District has finalized their Inventory Data.

(9) Providing status on the bridge inspection and evaluation program at least annually to the MSCs Dam Safety Committee.

c. HQUSACE. The CECW-CE shall be responsible for the following activities:

(1) Providing the USACE Bridge Program Manager (see paragraph 10) responsible for oversight of all phases of the USACE Bridge Safety Program. The USACE Bridge Program Manager is responsible for bridge inspection policies and procedures, quality assurance and quality control, preparation and maintenance of a bridge inventory, bridge inspections, reports, load ratings, bridge evaluations, and other requirements of the NBIS.

(2) Coordinating with CECW-CO on the annual O&M budget process for funding existing bridge inspections, evaluations, repairs, improvements, or rehabilitation related to bridge safety.

(3) Developing policy and procedures for implementing a Bridge Safety Program covering public use bridges and other USACE bridges.

(4) Providing policy advice to HQUSACE elements on any new legislation related to the safety of USACE bridges.

(5) Providing policy compliance review of all decision documents related to bridge safety deficiencies.

(6) Acting as proponent for training needs of USACE bridge engineers and coordinating the training effort with courses offered by FHWA and American Association of State Highway and Transportation Officials (AASHTO).

(7) Acting as liaison with state and other federal agencies to evaluate procedures and capabilities with respect to bridge safety.

(8) Provide quality assurance review of MSC programs and quality reviews, including audits of representative samples of the bridge inventory annually.

d. CEERD. CEERD shall be responsible for maintaining the CEBIS database and compiling SI&A data of USACE Public Highway/Roadway bridges, and submitting to CECW-CE for reporting to FHWA by 21 March of each calendar year.

## **10. Qualifications of Bridge Safety Program Team**

a. USACE Bridge Program Manager. The USACE Bridge Program Manager shall be a structural engineer who meets the requirements of paragraph 650.309 of the National Bridge Inspection Standards (NBIS), be a licensed professional engineer, and have at least five years experience in bridge inspections, evaluations, design, maintenance, or construction. See Reference a.

b. MSC Bridge Program Manager. The MSC Bridge Program Manager shall be a structural engineer who meets the requirements of paragraph 650.309 of the National Bridge Inspection Standards (NBIS), be a licensed professional engineer, and have at least five years experience in bridge inspections, evaluations, design, maintenance, or construction.

c. District Bridge Program Manager. The District Bridge Program Manager shall be a structural engineer who meets the requirements of paragraph 650.309 of the National Bridge Inspection Standards (NBIS), be a licensed professional engineer, and have at least five years experience in bridge inspections, evaluations, design, maintenance, or construction.

d. Field inspection team. All field inspections shall be performed by a team consisting of at least two people. A Team Leader shall be present at every inspection. Additional personnel may not actively participate in an inspection unless they meet the qualifications of a bridge technical specialist. Other personnel will be involved as needed, for safety and/or assistance during the inspection.

### **(1) Team Leader**

(a) Public Highway/Roadway bridges, Short Span bridges, and Public Pedestrian Bridges. The team leader for these type Bridges shall be a structural engineer who meets the minimum qualifications stated in paragraph 650.309 of the NBIS.



(b) Non-Public Access, Non-Public Pedestrian, and All Other Pedestrian Bridges. The team leader for these type Bridges shall be a structural engineer who meets the minimum qualifications of paragraph 10.d.(1).a or has a minimum of five years experience in civil works structural inspections and has completed a comprehensive training course based on reference f.

(2) Bridge technical specialists shall meet the following minimum qualifications:

(a) Have a Bachelor of Science Degree in Civil Engineering or Structural Engineering, or

(b) Have an Associate Degree in Civil Engineering Technology and have completed a comprehensive training course in Engineering Concepts for Bridge Inspectors based on the current version of reference f.

(c) All Other Pedestrian Bridges. Inspector qualifications will be determined by the District Bridge Program Manager.

(3) The mechanical and electrical engineer involved with the inspection of movable bridges (swing, bascule, and vertical lift bridges) shall be licensed professional engineers who are proficient with the methods and procedures described in Chapter 20, reference f.

e. Underwater inspections. All underwater inspections shall be conducted under the direct supervision of a qualified bridge inspection team leader. An underwater bridge inspection diver shall complete an FHWA underwater diver bridge inspection training course for diving inspection on Public Highway/Roadway bridges, Short Span bridges, and Public Pedestrian Bridges.

f. Scour Evaluations. Structural, hydraulic, and geotechnical engineers involved with the bridge scour evaluation should be licensed professional engineers who are proficient in the methods described in references j through m and shall have successfully completed a FHWA training course for stream stability and scour. All scour evaluations shall be conducted under the direct supervision of a qualified bridge inspection Team Leader or Bridge Program Manager.

g. Structural Evaluations. The individual charged with the overall responsibility for load ratings, fracture and fatigue evaluations, seismic evaluations, and other structural evaluations, shall be a structural engineer, a licensed professional engineer, have at least five years experience in bridge inspections and relevant evaluations and shall have completed USACE or FHWA/NHI sponsored training.

h. Independent technical review. Reviewers shall be senior engineers who have the proper knowledge, skills, training, and experience, and who were not directly involved in the evaluation or inspection and report preparation being reviewed. The reviewer's qualifications shall not be less than those stated in this section, as applicable, nor less than those required for the engineer who produced the work. Names and qualifications of the reviewers should be included in the Districts' QCPs. See reference z for more guidance.

i. **Refresher Training.** Periodic refresher training is required for all Bridge Program Managers, Team Leaders, and Independent Technical Reviewers to maintain their qualifications. Inspection refresher training shall follow requirements of NBIS and must be USACE or FHWA/NHI sponsored training. Engineers responsible for evaluations shall complete continuing education training in the fields applicable to their responsibilities. Refresher training shall be completed at five year intervals.

j. **Documentation Requirements.** All qualifications for District and MSC personnel shall be documented in the District and MSC QMPs and shall include a description of experience meeting the requirements of the NBIS and this Engineering Regulation. Alternate qualifications may be submitted for review and approval by the MSC, as applicable. When evaluating experience, the following shall be considered:

(1) The relevance of the individual's actual experience, i.e., has the other experience enabled the individual to develop the skills needed to properly lead a bridge safety inspection or evaluation.

(2) Exposure to the problems or deficiencies common in the types of bridges being inspected or evaluated by the individual.

(3) Complexity of the structures being inspected or evaluated in comparison to the knowledge and skills of the individual gained through their prior experience.

(4) The individual's understanding of the specific data collection needs and requirements.

(5) Demonstrated ability, through some type of a formal certification program, to lead bridge safety inspections or evaluations.

(6) The level of oversight and supervision of the individual.

See reference z for additional guidance and documentation format.

## **11. Quality Management**

Quality management includes Quality Control (QC) and Quality Assurance (QA) procedures applied to all aspects of the USACE Bridge Safety Program. Quality management will be implemented throughout all levels of the organization.

a. A Project Management Plan (PMP), including a Quality Management Plan (QMP), shall be developed for each District Bridge Safety Program. The PMP shall include a 5-year inspection plan, budget, and schedule. Condition, age, size, and traffic are some of the parameters to consider in establishing priorities for the inspection plan. A copy of this plan is to be furnished through the MSC to the USACE Bridge Program Manager by 15 February of each year. See reference z for guidelines on developing a PMP and QMP.

b. **Quality Control.** Quality Control (QC) consists of systematic, detailed procedures conducted to maintain quality, accuracy, and consistency in the performance of bridge inspections and evaluations and ensure conformance with inspection and evaluation standards and criteria. The District Bridge Program Manager is responsible for ensuring QC is conducted as required. The Bridge Program Manager will use the QC program to evaluate effectiveness of the inspection team, provide feedback to improve performance, and recommend actions to prevent reoccurrence of policy violations.

(1) **Quality Control Plan (QCP).** The QCP is a component of the QMP and PMP. The QCP is a written plan that defines how quality control will be executed for products. A QCP shall be developed for each bridge inspection and shall include an inspection plan. The inspection plan includes inspection type, inspection and pre-inspection procedures, reporting procedures, inspection tools, access, inspection team and independent technical review (ITR) team members and their qualifications. A single QCP can be used for bridges of similar types and size and scope of effort. See reference z for minimum content of a QCP.

(2) **Inspections.** Quality checks of inspections shall be conducted by a qualified inspection Team Leader. Quality checks include review of the bridge file, previous inspection reports, compliance with the inspection plan, recording of condition, and inspection documentation. The quality checks and reviews will follow a standard checklist and will report findings on a standard form (see reference z for more detail on QC checklists, procedures, and reporting).

(3) **Evaluations.** A quality check and review will be conducted on all bridge evaluations for accuracy of calculations and compliance with criteria.

(4) **Independent Technical Review.** Independent Technical Review (ITR) is a review by a qualified person or team not involved in the day-to-day production of a project/product, for the purpose of confirming the proper application of clearly established criteria, regulations, laws, codes, principles and professional practices. ITR is a holistic, comprehensive review. While ITR is a critical component of quality control, it will not replace checks or other quality control processes. Reviewers must meet the qualifications stated in paragraph 10. An ITR shall be completed for each inspection and evaluation conducted for each bridge within a District's inventory and must be completed and recorded in the CEBIS database.

(a) **Inspection ITR.** An ITR of an inspection consists of a review of all inspection-related documentation to verify the inspection plan was prepared and followed, a qualified inspection team was used, standard forms were used, recording criteria is met, the inspection was properly documented, and recommendations are reasonable. On site review of inspection procedures may be necessary for complex bridges, bridges with significant deterioration, and bridges with large traffic volumes. ITR checklists will be used to aid in the documentation of the review. See reference z for standard ITR review procedures and documentation.

(b) **Evaluation ITR.** ITR of evaluations consists of a review of calculations and procedures to verify compliance with applicable criteria, reasonable assumptions were used, and proper application of results is executed. ITR checklists will be used to aid in the documentation of the review. See reference z for standard ITR review procedures and documentation.

c. **Quality Assurance.** Quality Assurance (QA) is that part of quality management focused on providing confidence that project quality requirements defined in the PMP will be fulfilled. QA includes those processes employed to assure that QC activities are being accomplished in accordance with planned activities and that those QC activities are effective in producing a product that meets the desired end quality. For products or services being prepared by the owning District or activity, QA will be performed by the Regional Headquarters. The District is responsible for QA for inspections and evaluations prepared by another District, government agency, or A-E contract. See reference z for standard QA review procedures and documentation. The USACE Bridge Program Manager is responsible for oversight of all QA programs.

(1) The District will review documents prepared by another District, government agency, or A-E firm to ensure contract compliance and to verify that the appropriate criteria and assumptions were used including the requirements of the NBIS and this ER. This effort should not be an in-depth technical review, but should be performed to the degree necessary to satisfy the reviewer that the Government is receiving a full response to contract requirements. The Quality Assurance Plan (QAP) is a component of the QMP and PMP. The QAP is a written plan that defines how quality assurance will be executed for products prepared by others.

(2) **Program Review.** A Program QA review will be conducted by the MSC to ensure USACE policy is uniformly and consistently applied to all District inspections and evaluations, District QC and QA is properly applied, and work is conducted by qualified personnel. Review will include a field review to monitor inspection procedures and/or to compare inspection results with existing conditions. The MSC is responsible for ensuring qualified personnel are involved in the reviews. QA checklists will be used to aid in the documentation of the review.

d. **Approval and Certification.** Each inspection and evaluation must be certified by the District.

e. **Quality Assurance Audits.** The USACE Bridge Program Manager is responsible for conducting QA audits on the District Bridge Safety Programs in compliance with the NBIS and this regulation. The USACE Bridge Program Manager will review all documentation related to the District's Bridge Safety Program and will conduct site visits on individual bridges as necessary. Each District will be audited on a four year cycle. The USACE Bridge Program Manager will submit a summary report annually to the FHWA.

## **12. Inspection Procedures**

Inspection procedures are defined or referenced in the PMP.

a. **Notification of inspections.** The USACE Bridge Program Manager shall be notified, through the MSC, at least 30 days in advance of a scheduled inspection in order to determine whether a HQUSACE representative(s) will participate in the inspection. Provide notice of any schedule changes to the USACE Bridge Program Manager through the MSC as soon as they are known.

b. Responsibilities. Inspect each bridge in accordance with the NBIS, reference q, and this regulation. Provide at least one team leader, who meets the minimum qualifications stated in paragraph 10, at the bridge at all times during each initial, routine, in depth, fracture critical member and underwater inspection.

c. Bridge Files. Prepare bridge files as described in reference z.

d. Identify bridges with FCMs and fatigue sensitive details, bridges requiring underwater inspection, and bridges that are scour critical using the standard procedures and forms of reference z.

e. Underwater inspections. Describe and identify the location of underwater elements, identify the inspection frequency, and describe the inspection procedures for each underwater inspection. Inspect underwater elements according to these procedures. Underwater inspections shall be conducted by a qualified diver under the direct supervision of a qualified bridge inspection team leader following these procedures. See references f, w, and z for guidance on inspection procedures.

f. Bridges with fracture critical members and fatigue sensitive details. Describe and identify the location of FCMs and fatigue sensitive details, identify the inspection frequency, and describe the inspection procedures for each FCM and fatigue sensitive details inspection. Inspect FCMs and fatigue sensitive details according to these procedures. See references p, w, and z for guidance on inspection procedures.

g. Scour Critical Bridges and Bridges with Unknown Foundations. Inspection records shall include a plan of action to monitor known and potential deficiencies, and to address critical findings. Scour critical bridges shall be monitored in accordance with that plan. See reference z for procedures in developing a plan of action.

h. Seismically Vulnerable bridges. Identify bridges that are seismically vulnerable as defined in reference z. Conduct seismic evaluations as required in paragraph 15.

i. Procedures for inspection of movable bridges. See references f, g, and x for details.

j. Special Feature and Complex Bridges. Identify specialized inspection procedures and additional inspector qualifications, including experience and training required to inspect complex bridges and special features. See reference z for guidance on inspection procedures and qualifications. Bridges shall be inspected according to procedures.

k. Safety plan. A safety plan shall be prepared for all inspections in which the inspector's safety is at risk (see reference d). Examples of risk include falls and traffic. See reference y for guidelines on traffic control. When working over water, see Reference s. Include the safety plan in the Bridge File.

### **13. Load Capacity Rating**

a. Public Use Bridges. All Public Highway/Roadway bridges and Short Span bridges shall be rated for safe load-carrying capacity in accordance with reference q. See reference z for guidance on conducting load ratings.

(1) A load capacity rating shall be performed as part of:

(a) The initial inventory inspection.

(b) Periodic routine inspections if rating is not available in records or if the inspection reveals previously unknown conditions that affect the bridge load capacity.

(c) Special inspections after bridges experience significant events such as hurricanes, earthquakes, fires, floods, or collisions.

(2) A load rating shall be performed whenever the dead load from the bridge surface has increased due to a major rehabilitation or replacement of the decking.

b. Load capacity rating for Public Pedestrian bridges. All Public Pedestrian bridges shall be rated for safe load-carrying capacity using the pedestrian load guidance in reference n as modified in paragraph 14b. These bridges shall also be rated for vehicle or other loadings, if applicable, following loading guidelines of reference n, including commentary. Vehicle ratings may be based on the Legal Load Rating procedures defined in reference q.

c. Load capacity rating for Non-Public and All Other Pedestrian bridges. All Non-Public and All Other Pedestrian bridges shall be rated for safe load-carrying capacity using acceptable standards. Acceptable standards shall be determined by the District Bridge Program Manager. Material properties should be conservatively estimated if no material specifications or other records are available.

d. Load capacity rating for Non-Public Access bridges. All Non-Public Access bridges shall be rated for safe load-carrying capacity using expected loads and load configurations. Rating procedures shall follow AASHTO bridge rating standards. Loads shall be limited to safe levels. Safe levels may be based on the Legal Load Rating procedures defined in reference q.

e. Load capacity rating for Railway bridges. Railway bridges shall be rated for safe load carrying capacity in accordance with reference r. Load ratings shall be based on the Cooper E80 load and expected loads and configurations (reference r). See reference z for further rating guidelines.

f. Evaluation of Steel Bridges for fatigue and fracture. A fatigue evaluation shall be conducted for all public use bridges with FCMs and all public use bridges with fatigue sensitive details. The evaluations shall follow procedures from reference q. A fracture analysis shall be conducted when cracks are detected. See reference z for more detail.

#### **14. Load Limit Posting**

a. Public Highway/Roadway bridges and Short Span bridges. These bridges shall be posted for load-carrying capacity in accordance with reference q and z. If the bridge condition requires reducing the posted limit to less than 2.7 metric tons (3 tons), the bridge shall be closed for vehicular traffic.

b. Load posting for pedestrian bridges. All pedestrian bridges shall be posted when the safe load capacity is below 3.1 kPa (60 psf) of uniform load. The posting shall limit the number of pedestrians on the bridge at one time. Bridges with a safe load capacity below 1.9 kPa (40 psf) of uniform load shall be closed. Higher posting and closing limits may be imposed by the District Bridge Program Manager if use and consequences of failure warrant increased limits. Bridges shall be closed if bridge railing does not meet the loading requirements of reference d.

c. Railway bridges. See reference z for guidance on control of railway loads when the safe load capacity is below the Cooper E80 load or expected loads and configurations.

## **15. Seismic Evaluation of Bridges**

a. Seismic performance category, soil type and importance classification for all bridges shall be identified and recorded in the bridge inspection report and CEBIS. Importance classifications are either standard or essential. Guidance for categorizing, typing, and classifying is provided in reference v. Additional information is found in reference z.

b. All bridges classified as Seismic Performance Categories B, C, and D shall be rated in accordance with the Preliminary Screening Process of reference u. Bridges that are seismically vulnerable shall be evaluated using the detailed evaluation process in reference u. Seismic retrofits shall be developed in accordance with reference v. Screenings and evaluations are not required for bridges in Seismic performance Category A. Additional information is found in reference z.

## **16. Inventories and Inspection Report**

a. Report preparation. Bridge inspection data shall be recorded on standard forms as provided in reference z. A formal technical report shall be a permanent record and will serve as a basis for determining the need for remedial work. The report will be based on a detailed inspection and evaluation of each bridge as to its safety and structural adequacy. As a minimum, the report shall contain the results of the inspection, recommendations for remedial work, and approximate total cost. In order to more accurately portray conditions and changes in conditions of surfaces and structural details, photographs are generally required. Photographs shall be provided of all areas requiring visual monitoring or critical regions of structural distress. Reports shall be those generated by CEBIS.

b. Report review and District Approval. All bridge inspection and evaluation reports shall receive an independent technical review. The District's Chief of Engineering Function shall

certify that the inspections and evaluations were performed in accordance with this regulation and the referenced criteria by qualified engineers. The District shall also certify that all remedial work necessary to ensure that the safety of the bridge is being developed on an appropriate schedule. Certification and approval shall be completed in and follow procedures of reference z.

c. Inventory preparation. Each District shall prepare and maintain an inventory of all bridges within the District using CEBIS. Newly completed structures, physical changes to existing structures which would alter previously recorded data, and placement of load and/or speed restriction signs shall be entered in the District CEBIS within 60 days after the change in condition.

d. Bridge files shall be maintained for each bridge following procedures of reference z. Results of bridge inspections and actions taken to address the findings of such inspections shall be maintained within CEBIS.

## **17. Reporting Distress**

a. If the bridge inspection and evaluation indicate evidence of distress or potential failure requiring immediate remedial action, the District shall inform CECW-CE and CECW-OD immediately through the MSC office. Emergency situations will be handled in accordance with the guidance set forth in reference c and reference z.

b. Follow-up on critical findings. Procedures described in the reference z shall be followed to assure that critical findings are addressed in a timely manner. Districts shall notify the MSC of the actions taken to resolve or monitor critical findings.

## **18. Interagency Coordination**

In those cases where ownership of major elements is divided between the Corps and other agencies, information pertinent to the condition of project elements owned by others, as observed by the Corps inspection team, shall be furnished to the co-owner for information purposes only.

## **19. Funding**

Requests for funding of bridge inspections, maintenance, and repair shall be prioritized and submitted to CECW as part of the annual Civil Works budget process.

FOR THE COMMANDER:

2 Appendices  
Appendix A References  
Appendix B Subpart C- National Bridge Inspection  
Standards

YVONNE J. PRETTYMAN-BECK  
Colonel, Corps of Engineers  
Chief of Staff



